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Proceedings of the Botanical Club, A. A. A. S., Buffalo Meeting,
August 25-29, 1896.

TUESDAY, AUGUST 25TH. MORNING.

In the absence of Mr. Coville, President, and Prof. MacMillan, Vice-President, Prof. Kellerman was elected President *pro tem*. Mr. Cowell, Secretary, submitted the registration book for signatures of members present and distributed badges.

Prof. Kellerman distributed copies of a map of Ohio, showing the distribution in the southern counties of that state of *Phoradendron flavescens*, *Bignonia crucigera*, which covers the fences in some places, and *Polypodium polypodioides*. Prof. Coulter remarked on the distribution of the *Phoradendron* in the lower Wabash region of Indiana and Illinois. Prof. Tracy stated that it is abundant in southern Illinois, and Prof. MacDougal recorded its occurrence at points in southern Indiana.

Prof. Kellerman remarked that the Canada Thistle, *Carduus arvensis* does not spread in southern Ohio. Prof. Lazenby stated that seeds of the plant are not formed in the region.

Prof. L. R. Jones described a method of distributing pure cultures of fungi. Owing to mixed growth of several species of fungi upon the same substratum, it is often difficult to obtain an uncontaminated growth for distribution in exsiccati. The growth and distribution of pure cultures easily obviates this difficulty. These pure cultures can readily be made in quantity and in convenient form for distribution by placing paraffined paper in the bottom of large culture dishes; the agar, or other nutrient medium, is then poured upon this, and seeded with spores from a pure culture. When colonies have reached sufficient development, the whole is dried down, the paper bearing the fungus is removed from the dish and cut up for distribution. Prof. Jones suggested that the method might be applied to the distribution of bacterial cultures. Concerning this, Prof. Russell stated that the method could not be used for the propagation of such cultures, as the bacteria, especially the non-sporogenous forms, die out so easily when subjected to desiccation. It might be of service, however, in preserving the appearance of colonies. Mr. Duggar inquired if

Prof. Jones had tried distributing cultures on mica. Prof. Jones replied that the paraffined paper was cheaper.

Mrs. Britton reported the occurrence of the moss *Tetraplodon bryoides* in large quantities on the timbers soaked with drainage from the stables on the summit of Mount Washington, N. H., and distributed specimens collected there in July, 1895, by Mr. Edwin Faxon, Dr. Geo. G. Kennedy and Mr. E. F. Williams; it had previously been found only in small patches on this mountain. She also remarked on the distribution of the species in North America.

Judge Day remarked as follows on *Iris*: It seems to be a character of the rhizomatous species of *Iris*, when forming flowers for the following season, to produce at the extremity of the rhizome three buds, side by side, of which the two lateral ones are merely vegetative and the central one, alone, productive of flowers. I have noticed this character in *Iris versicolor*, *Virginica*, *verna*, *cristata* and *cuprea*, of North America, and *Kaempferi*, *pumila*, *Siberica*, *Pseud-acorus*, *sambucina*, *Florentina* and *Germanica*, so-called, of the Old World. I have failed to find it in any of the bulbous *Irises*, or in any other genus of the Iridaceae, and think the observation has not been heretofore recorded.

Prof. Bessey remarked on the distribution of the bear-berry, *Arctostaphylos Uva-ursi*, in Nebraska, stating that it is known to occur with *Pinus ponderosa* in two widely separated stations near the 100th meridian, one of these being in a cañon in the central county (Custer) and the other a cañon on the south side of the Republican River, near the south border of the state. Judge Day said that in the Buffalo region it follows the Niagara River, but does not enter the gorge. Prof. Bessey remarked that ericaceous shrubs will not grow on the plains.

TUESDAY, AUGUST 25TH. AFTERNOON.

Prof. Newcombe described an improvement to the paraffine-bath, consisting of a device for adjusting the receptacles of the bath at various heights so as to secure different temperatures in the receptacles, while the temperature of the bath remains constant. This adjustment can only be made in baths in which there are closely fitting, removable receptacles, sitting into pockets. Such a

bath can easily be made to order, and to the bottom of the receptacle brass strap-springs can be so riveted as to sustain the receptacle at any height by pressure against the side of the pocket.

Prof. Rowlee presented the following notes on the branching of oaks :

I. Our species of trees differ very widely in their method of branching. All, however, with the possible exception of the cottonwood, agree in that the branches are produced from the buds nearest the terminal bud of a season's growth. No group has this peculiarity in so marked a degree, however, as the oaks. In them the internodes near the terminal bud are shortened and the branches appear close together. The branches appear in periods upon a main branch, each branch-bearing region being in the immediate vicinity of a season's terminal bud. This peculiar method of branching contributes toward the rigid character of an oak tree. It is primarily due to the position of the branches and the short nodes in that region.

II. Normally oaks make a definite seasonal growth terminated by winter bud. A tree (*Quercus macrocarpa*) in the writer's yard has departed from this mode of growth during the present season in a very decided manner. Early in the season, in May and early June, the tree in question developed normal annual shoots, each terminated by a winter bud. In the early days of July these winter buds swelled and developed into leafy shoots duplicating the growth already made. There was more contrast between the first and last leaves of the last growth and the leaves were very light colored. The question naturally arose whether the double seasonal growth in length was accompanied by double cambial growth; sections show that up to the time of the investigation (August) but a single ring had been formed, that is, the cambial growth had been continuous.

[In the discussion which followed this paper it was stated that fruit trees frequently made a double seasonal growth in one year, and that autumnal flowering of fruit trees was accompanied by this phenomenon.]

III. Specimens of white oak branches were exhibited illustrating an unusual degree of variation in the branches of an individual tree. This tree is isolated from dwellings and from other

trees and stands in a field east of Ithaca. The main part of the tree is normal, a single branch on the east side and low on the tree has much smaller leaves and acorns. The contrast between this branch and the rest of the tree is so marked as to be seen at considerable distance, and was well shown in the branches exhibited.

WEDNESDAY, AUGUST 26TH. MORNING.

Prof. L. R. Jones presented some notes on potato-leaf blights, stating that *Phytophthora infestans* D. By. is common only in northern New England, northern New York and Canada. The so-called "Early Blight," attributed to the parasitism of the fungus *Macrosporium Solani* E. & M., is generally due not to the attacks of any fungus, but to arsenical poisoning, or to drought or other unfavorable conditions surrounding the plant. On such dying potato leaves there occurs very generally a saprophytic fungus closely resembling *Macrosporium Solani*, but which in cultures develops quite differently. This fungus is distinctly an *Alternaria*, ten or fifteen spores often being produced in a single chain. *Macrosporium Tomato* Cooke, develops exactly similar chains of spores in culture, and it seems probable that the *Alternaria* from the potato leaf is the same as the tomato *Macrosporium*, but which should properly be called *Alternaria Tomato*. Under especially favorable conditions *Macrosporium Solani* has also developed spores in chains, and hence should be known as *Alternaria Solani*.

Dr. Russell described a method of hindering the condensation of water in Petri plates where agar is used as a medium. It was simply to enclose culture dish in an ordinary porcelain bowl and cover same with a smaller inverted one. This maintains an equal temperature, both inside and outside of culture, thereby preventing the accumulation of condensed water on under-surface of cover.

Dr. Bessey gave an outline of the flora of Colorado Springs, stating that there was here a sudden transition between the floras of the plains and the mountains. In the vicinity of the town, at an elevation above the sea of about 6,000 feet, the plants are nearly the same as those about Lincoln, Nebr., which is situated near the eastern side of the plains. He explained that radiating

from Pike's Peak, down to the plains, there are numerous deep dark cañons, whose vegetation was very different from that of the plains or the mountains proper. The cañon flora, however, has been greatly modified by forest fires, causing the opening up and drying out of the gorges, as in the case of South Cheyenne Cañon, and by the vandalism of tourists who have ruthlessly destroyed ferns, columbines, *Calochortus*, and other showy plants. The flora of elevations from 10,000 to 13,000 feet is scant and low on the open dry ridges and summits; in the mountain meadows, grasses, sedges and clovers abound; the mountain swamps are overgrown with *Potentilla fruticosa*, but no sphagna were observed. Prof. L. R. Jones remarked that *Potentilla fruticosa* took possession of old fields and pastures in Vermont, becoming a weed.

Mr. E. J. Durand reported a new station for *Epipactis viridiflora*; this plant appeared with some ferns on a lawn in the village of Canandaigua, N. Y., which had been transplanted from some point in the vicinity. Judge Day remarked that attempts to cultivate it at Buffalo had not succeeded. Mrs. Britton said that a similar experience had been had with *Arisaema Dracontium* on Staten Island, which came up in a fern bed, while no other station for the species is known on the island.

Mr. Pollard, Assistant Curator of the U. S. National Museum, explained briefly the terms of transfer which has been effected of the National Herbarium from the control of the Department of Agriculture to that of the Smithsonian Institution. The work is now carried on by three assistant curators under the general supervision of Mr. Frederick V. Coville, Honorary Curator; and Congress has this year appropriated the sum of \$10,000 for the care and maintenance of the herbarium.

Mrs. Britton made the following remarks on the rediscovery of *Schizaea pusilla* in Newfoundland: The Rev. A. C. Waghorne has recently sent me two small tufts of this little fern which he collected last year about 70 miles from Bay of Islands, Newfoundland; "in bogs, borders of ponds, the quarry N. W. of the railway." The specimens are small like those I collected in Nova Scotia, but they have an abundance of fertile fronds, which are quite mature. It will be remembered that this is the fern that was found in the herbarium of De La Pylaie, from Newfoundland,

but that it was for a long time doubted whether it could possibly have been found there, Dr. Gray and others supposing that the locality must have been a mistake, and that the specimens must have come from New Jersey. This discovery completely settles that question, and makes it evident that it is only those who know what to look for will find this fern, and that it will be found in intermediate stations between Nova Scotia and New Jersey, along the coast of New England, possibly on Long Island.

Mr. Karl M. Weigand presented the following notes on the genus *Boschniakia*. Specimens of *Boschniakia* recently received from Tacoma were found not to agree at all well with the existing characterization of this genus as given in the Synoptical Flora. This led to an examination of all the herbarium material at hand, with the following results: It was found, in the first place, that instead of being "ebracteolate" all members of the *strobilacea* group have some or all of the flowers subtended by two subulate bractlets, and, instead of "calyx truncate behind and with three teeth in front," two teeth only were found in the above mentioned group and these were always lateral. The subdivisions found in the Synoptical Flora are also unjustifiable. In the *strobilacea* group the calyx-teeth are not longer than the tube, and not always subulate; the scales are not always obtuse, and the placentae in one case were found to be three instead of four. Specimens of *B. glabra*, the species on which the genus was founded, on the other hand, agree exactly both with the generic description and with the sections, and it seems, therefore, as if the characterization had not been properly changed in the addition of subsequent species. *B. Hookeri* is probably not distinct from *B. strobilacea*, as Dr. Gray suggested in Proc. Amer. Acad. in 1887. Although not a sufficiently large number of specimens have so far been examined to warrant definite conclusions, it seems certain that this genus is in need of a thorough revision, and it is thought desirable to call attention to the above noted discrepancies for the purpose of drawing criticism from others.

WEDNESDAY, AUGUST 26TH. AFTERNOON.

The committee on nomenclature submitted the following report:

To the Botanical Club, A. A. A. S.:

Your committee on nomenclature, which was requested at the Springfield meeting to prepare a report, would respectfully submit the following preamble and resolutions:

WHEREAS, A large number of requests for a list of all North American Pteridophyta and Spermatophyta has been received, and publication for such a list, when prepared, has been informally offered by the Assistant Secretary of the Smithsonian Institution;

Resolved, That the committee be and hereby is authorized to prepare for publication a list of Pteridophyta and Spermatophyta occurring in the United States and the British possessions of North America.

Resolved, That the committee be and hereby is authorized to prepare and publish a supplement to the "List of Pteridophyta and Spermatophyta of Northeastern North America," such supplement to contain additions and published corrections to the List. Such publication has been promised by the Editor of the Torrey Botanical Club.

Resolved, That the committee be and hereby is authorized to prepare a fuller statement of the rules adopted at the Rochester and Madison meetings, with examples illustrating their operation, and submit it to the Club at a subsequent meeting, for publication in the proposed List of North American Pteridophyta and Spermatophyta.

For the Committee,

N. L. BRITTON, *Chairman*.

The report was discussed by Prof. Coulter and Prof. Bessey, was approved and the resolutions unanimously adopted.

Mr. Pollard, on behalf of Dr. F. H. Knowlton and others, submitted a resolution calling for the appointment of a committee to consider and report on the desirability of the Club publishing a journal. After considerable discussion, it was laid on the table.

Prof. Barnes discussed the relative merits of the terms photosyntax and photosynthesis, maintaining that the first was the more desirable. Prof. MacDougal considered that both terms were temporary, but inclined to the use of the second.

Prof. Bessey remarked on the distribution of *Pinus ponderosa* in Nebraska, which to-day forms extensive forests on the summits of Pine Ridge (alt. 4,000 to 5,000 feet), in northwestern Nebraska, and extends eastward along the bluffs of the Niobrara River to within twenty-five or thirty miles of its mouth. It extends eastward along the North Platte River and Lodge Pole Creek, nearly

or quite to Deuel County. It occurs, also, in isolated cañons in the central counties (in the Loup River Valley) and thence fifty or sixty miles eastward. Recently some remains of a considerable grove of pines was discovered along the bluffs of the Republican River, in Franklin County, about fifty miles east of the 100th meridian.

Mr. Cowell exhibited specimens of hybrid and double-flowered sunflowers, *Helianthus decapetalus* \times *H. petiolaris* and *H. lenticularis*.

THURSDAY, AUGUST 26TH. MORNING.

Prof. Bessey remarked on the cañon flora of the plains. On the Great Plains there are two nearly distinct floras, viz: (a) that of the general surface, which, as we pass westward, is more and more like that of the arid regions, and (b) that of the river valleys and cañons, in which are found trees, shrubs and herbs which have invaded this dry region from the east and west. The line of demarcation between the cañon flora and that of the general surface is often very sharp, the one giving way to the other within the space of a yard or less.

Dr. E. B. Copeland discussed turgor-variations in the mosses. He stated that turgor is higher in the mosses than in most other plants, and exceedingly variable. Tests were made on various species, especially *Mnium cuspidatum* and *Funaria hygrometrica* at temperatures varying from 0°–34° Centigrade, the turgor being determined by plasmolysis in solutions of potassium nitrate. From near zero up to 20°C. there was a decided decrease of turgor with increase of heat. This variation is due to chemical changes in loco, but seems to be unaccompanied by any change in the starch or sugar present. In *Mnium*, however, it is dependent on the presence of not very remote products of assimilation. This adjustment of the concentration of the cell sap is of manifest advantage in resisting variations of temperature.

Dr. A. P. Anderson described a simple apparatus for spraying plants, consisting of two tubes at right angles to each other, similar to the one used by artists for spraying crayon drawings.

Mr. E. J. Durand described the structure of pseudo-parenchyma in the higher fungi. In most of the higher fungi there is a tissue

which much resembles the parenchymatous or fundamental tissue of the higher plants. Owing, however, to its hyphal origin, it is usually termed pseudo-parenchyma. The transition from interwoven hyphae to this tissue may be well seen in the stromata of *Tubercularia*, especially if the perithecial forms be present. The hyphae become much septate and the cells swollen and coalesced, forming a tissue of rounded cells. In the *Pezizas* and *Discinas*, also, we find the transition nicely shown. In these plants the cells are often large and vesiculose, but are formed by the septation and coalescence of large hyphae.

Mr. H. von Schrenk discussed the host-plants of *Comandra umbellata*. He stated that though this species generally grows on various Ericaceae, notably *Vaccinium Pennsylvanicum* and *V. corymbosum*, he had found it on *Potentilla*, *Solidago* and *Phleum pratense*. He had found that there is no connection between the vascular systems of the parasite and the host-plant in *Phleum*, and had also cultivated the *Comandra* at St. Louis, independently of any host-plant, the plants growing to a height of several inches. He had collected *C. pallida* in Newfoundland, growing on *Vaccinium* and *Solidago*. Dr. Bessey stated that both *C. pallida* and *C. umbellata* occur in Nebraska at least 1,000 miles from any ericaceous plant. Prof. Coulter reported that he had satisfied himself that in the vicinity of Chicago *C. umbellata* grew unattached to any host.

Prof. MacMillan spoke on "The Function of the submerged Leaves of *Salvinia natans*." These hair-like leaves have been supposed to function as absorbing root-hairs, but he had observed that the rigid tips of these organs serve to prevent small aquatic animals from approaching the sporocarps, which they guard; he also stated that they project at right angles to the stem and thus serve as a counterpoise against the wind. Dr. B. B. Davis said that he had observed them entangled with humus and slime.

Prof. MacMillan remarked on "Nuclear Budding in *Cypridium*." He stated that in *C. Reginae*, *C. acaule* and *C. hirsutum* the nuclei of the cells at the base of the hairs divided by an interesting and singular method, which differs from both methods known as phragmation and karyokinesis, but was evidently referable to the former.

Prof. MacMillan also remarked on some unusual adaptations of conifers to wind-swept stations, stating that he had seen the white pine 40 feet high, with a small slender top and short branches, while at the base long branches had developed, lying prostrate on the rocks, having acquired a juniper-like habit; he had noticed that this habit was most frequently taken on when the main trunk was broken. Prof. Bessey recorded the same habit in Engelmann's Spruce, and Dr. Copeland recalled the well-known case of the Monterey Cypress.

Miss Florence Beckwith reported *Ononis repens* and *Plantago aristata* as additions to the flora of Monroe county, N. Y.

THURSDAY, AUGUST 26TH. AFTERNOON.

Officers for the next meeting were elected as follows:

President, Prof. S. M. Tracy.

Vice-President, Prof. L. R. Jones.

Secretary, Prof. E. S. Burgess.

Miss Edna Porter illustrated the pollination of *Epipactis viridiflora* by a model, stating that she had found the visiting insect to be a wasp, agreeing with Darwin's observations on the English species.

Dr. E. B. Copeland spoke on "The Lowest Limit of Turgor."

Nearly all of the material causing the turgor of normal stems, leaves and roots is unavailable as food, so that starvation can reduce the turgor but slightly. Thus it is seldom, if ever, possible to reduce this material by etiolation below the osmotic equivalent of 1.5% KNO_3 . Where food is stored in solution it is of course represented in the turgor, but even in such organs there is usually a considerable unused, presumably non-nutrient, residue until death.

Dr. Emily L. Gregory presented the following "Notes on the Classification of Lichens:"

In many of the modern text-books of systematic botany the three groups, fungi, algae and lichens are reduced to two, the lichens being placed with the fungi. It is evident that this arrangement is based upon the notion that the lichen is composed of a fungus and alga living together in the characters of parasite and host. It is the fungus which determines the form and de-

velops the spores; therefore those lichens whose fruiting is the same as the Ascomycetes are placed as a subdivision of this class, and the remaining forms, which follow the Basidiomycetes in their method of spore-formation, are classed with this group of fungi.

Within the past few years there has been a strong reaction against this method of classification on the ground that, by virtue of this long-continued parasitism, the lichens have attained fixed characters of their own, differing from those of both fungi and algae. Prof. Reinke, of Kiel, is one of the leading advocates of this old method of classification, namely, making the lichens an independent group coördinate with the fungi and algae. He has written an extensive paper on the subject, which is published in Pringsheim's *Jahrbücher*, volumes 26, 28 and 29. A careless or even hasty perusal of this article is apt to lead one to the conclusion that the author's views are radically opposed to those of Schwendener, who is generally known as the author of the theory of the dual nature of the lichens. It is probably owing to this fact that a rumor has obtained circulation among some of our botanists to the effect that the modern scientists are discarding the Schwendener theory of the nature of the lichens.

During the present summer I had an excellent opportunity to read and discuss this paper with Prof. Schwendener and in this way to obtain his present views on the subject. For these reasons I think a brief summary of his remarks may be of interest to the members of the Club and others who are not so familiar with the literature of this subject. It may be well to state at first that there is no difference of opinion between the two botanists concerning the real nature of the lichen. Reinke speaks in several places of his complete adherence to the principal theories set forth by Schwendener in his work published in 1869, "*Die Algentypen der Flechten-gonidien*," but he does not approve of the methods of classification which owe their origin to the acceptance of these theories. Reinke also strongly opposes the views held by Schwendener regarding the morphology of the podetium of the genus *Cladonia*. Schwendener claims that his experiments, together with those of Krabbe and others working in his laboratory furnish conclusive evidence that the podetium is a part of the fruit-body. Morphologically it is to be considered the stem of the

organ containing the spores, and this reasoning is based principally upon the fact that the mycelium threads forming the so-called ascogon, and which terminate in the asci holding the spores, may be traced backward through the podetium or stem to the point of its insertion on the horizontal thallus below. Reinke claims with equal emphasis that the podetium is to be ranked as a thallus, that it forms no part of the fruit-body; he upholds his claim chiefly by the fact that it acts as an assimilating organ and therefore must be considered as a vegetative part of the plant and not a reproductive organ. The importance which Reinke attaches to his view of the morphology of the podetium explains perhaps the above-mentioned conclusion of some readers of the article that the two botanists are antagonistic in their views on the lichens. Their difference of opinion comes rather from a radical difference in their interpretation of morphological characteristics, and not from any real difference concerning the question at issue, viz: the place which the lichens ought to occupy in the natural system of classification.

Regarding this point, Schwendener expressly says that he has no objection to the plan proposed by Reinke of classing the lichens as a group by themselves, but also states that he does not think this plan would entirely do away with the difficulties in question. He gives as an example of these difficulties the fact that there are several species of fungi belonging to one genus, some of which live as parasites on algae, or as lichens, others are true fungi living entirely after the fashion of other plants of this group. If the lichens are to be classed as a separate group, there must be some provision made for such plants as these, for it surely would not be logical to separate such closely allied forms by putting them in different groups.

Reinke proposes not only a rearrangement by which the lichens would be restored to their original dignity of place, but also outlines a plan for classification within themselves based as nearly as possible upon what he considers phylogenetic principles. It may be noted in closing that it is a little curious and striking that this plan is founded upon the classification of Tuckerman, a botanist who attached little importance to the principles of phylogeny in his treatment of the lichens.

A paper by Prof. L. H. Pammel, "Notes on some Plants of Iowa," was read by title.

Prof. Coulter discussed the use of the terms close-fertilization and cross-fertilization.

A paper by Mr. R. S. Williams, "A List of the Mosses of northern Montana," was read by title. Mrs. Britton stated that sets of these mosses were in preparation.

Prof. Kellerman described a method of card-indexing a state flora, using for each species a card on which was printed a map of the state showing counties. He had used this in Kansas and in Ohio. Prof. Tracy said he had successfully applied it to Mississippi.

New and noteworthy Species of *Saxifraga*.

BY JOHN K. SMALL.

SAXIFRAGA OCCIDENTALIS S. Wats. Proc. Am. Acad. 23: 264. 1888.

This species was founded on plants collected on Vancouver Island, by Prof. Macoun. It is a beautiful and distinct species averaging one decimeter in height, with a purple hue which extends even to the petals and filaments; it also possesses an abundance of red or reddish tomentum on the lower surface of the finely crenate leaves. This form is not as widely distributed as indicated by Dr. Watson, when he states "the specific name is given to the species as the western correlative of the common eastern *S. Virginiensis*," nor is it the western correlative of the latter species, *Saxifraga Californica*, proposed in the following year holding that place. *Saxifraga occidentalis* is apparently confined to Vancouver Island and the mainland in the immediate vicinity.

SAXIFRAGA VIRGINIENSIS Michx. Fl. Bor. Am. 1: 269. 1803.

Represents one of the most variable and perplexing species of the genus *Saxifraga*, but notwithstanding its variability in habit, size and flowers, there are two characters which serve to separate it from its relatives in western North America, namely, the triangular triangular-ovate or rarely almost lanceolate acute or acutish calyx-segments, and the narrowly elliptic or elliptic-spatulate obtuse or acute (rarely if ever notched) petals.